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**BTECH**  
**(SEM III) THEORY EXAMINATION 2023-24**  
**PYTHON PROGRAMMING**

TIME: 3HRS

M.MARKS: 50

**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief.**

| Q no. | Question   | Marks |
|-------|--|-------|
| a.    | What are the key components of the programming cycle in Python?  | 2     |
| b.    | Discuss the concept of type conversion in Python and provide examples of its usage.                                      | 2     |
| c.    | Explain the syntax and working of the if-else statement in Python. Provide examples demonstrating its usage.             | 2     |
| d.    | What are nested loops in Python? Provide examples demonstrating their usage  | 2     |
| e.    | Explain the concept of scope rules in Python functions.  | 2     |
| f.    | Describe the concept of slicing in Python strings.   | 2     |
| g.    | Discuss the efficiency of the Sieve of Eratosthenes algorithm compared to other methods of generating prime numbers.     | 2     |
| h.    | Define abstract data types (ADTs) and their significance in Python programming.  | 2     |
| i.    | Define simple search and discuss its time complexity. How can you estimate the search time for simple search algorithms? | 2     |
| j.    | Compare sorting algorithms in terms of efficiency?   | 2     |

**SECTION B**

**2. Attempt any three of the following:**

|    |   |    |
|----|---|----|
| a. | What are Boolean expressions in Python? Provide examples of Boolean expressions and explain their significance in programming. Discuss the concept of Boolean type conversion in Python and provide examples of its usage.                                    | 10 |
| b. | Explain the representation of floating-point numbers in Python. How does Python handle floating-point arithmetic? Discuss the process of expression evaluation in Python. How are expressions evaluated, and what are the common pitfalls?                    | 10 |
| c. | Describe the concept of slicing in Python strings. How does slicing allow you to extract substrings? Give examples illustrating slicing operations. How do you determine the length of a string in Python? Provide examples demonstrating the len() function. | 10 |
| d. | Discuss error handling techniques while working with file I/O operations. How do you handle exceptions that may occur during file operations?   | 10 |
| e. | Explain the binary search algorithm and its advantages over simple search. Discuss how to estimate the time complexity of binary search.  | 10 |

**SECTION C**

**3. Attempt any one part of the following:**

|    |  |    |
|----|--|----|
| a. | Discuss why Python is called as dynamic and strongly typed language? Construct a program to find the sum of all Odd and Even numbers up to a number specified by the user. | 10 |
| b. | Construct a Python program to construct the following pattern, using a nested for loop.  | 10 |



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|  | <pre>* ** *** **** *****</pre> |  |
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**4. Attempt any one part of the following:**

|    |  |    |
|----|--|----|
| a. | <p>A website requires the users to input username and password to register. Construct a program to check the validity of password input by users. Following are the criteria for checking the password:</p> <ol style="list-style-type: none"> <li>1. At least 1 letter between [a-z]</li> <li>2. At least 1 number between [0-9]</li> <li>3. At least 1 letter between [A-Z]</li> <li>4. At least 1 character from [!#\$%&amp;']</li> <li>5. Minimum length of transaction password: 6</li> <li>6. Maximum length of transaction password: 12</li> </ol> <p>Your program should accept a sequence of comma separated passwords and will check them according to the above criteria. Passwords that match the criteria are to be printed, each separated by a comma.</p> | 10 |
| b. | Explore the working of while, and for loop with examples.  | 10 |

**5. Attempt any one part of the following:**

|    |   |    |
|----|---|----|
| a. | <p>Construct a function <code>ret_smaller(l)</code> that returns smallest list from a nested list. If two lists have same length then return the first list that is encountered. For example:</p> <pre>ret_smaller([ [-2, -1, 0, 0.12, 1, 2], [3, 4, 5], [6, 7, 8, 9, 10], [11, 12, 13, 14, 15]]) returns [3,4,5] ret_smaller([ [-2, -1, 0, 0.12, 1, 2], ['a', 'b', 'c', 'd', 3, 4, 5], [6, 7, 8, 9, 10], [11, 12, 13, 14, 15]]) returns [6, 7, 8, 9, 10]</pre> | 10 |
| b. | <p>Construct following filters:</p> <ol style="list-style-type: none"> <li>1. Filter all the numbers</li> <li>2. Filter all the strings starting with a vowel</li> <li>3. Filter all the strings that contains any of the following noun: Agra, Ramesh, Tomato, Patna.</li> </ol> <p>Create a program that implements these filters to clean the text.</p>  | 10 |

**6. Attempt any one part of the following:**

|    |  |    |
|----|--|----|
| a. | Generate prime numbers with the help of Sieve of Eratosthenes.                   | 10 |
| b. | Write a Python program to check Armstrong number using object oriented approach. | 10 |

**7. Attempt any one part of the following:**

|    |   |    |
|----|---|----|
| a. | Write a python program for implementing Tower of Hanoi. | 10 |
| b. | Write a python program for implementing merge sort.     | 10 |